TABLE OF CONTENTS

5.1 FACTORS GOVERNING BRIDGE COSTS

Bridge costs are tabulated based on the bids received for all bridges let to contract. While these costs indicate some trends, they do not reflect all the factors that affect the final bridge cost. Each bridge has its own conditions which affect the cost at the time a contract is let. Some factors governing bridge costs are:

1. Location - rural or urban, or remote regions.
2. Type of crossing.
3. Type of Superstructure.
4. Skew of bridge.
5. Bridge on horizontal curve.
6. Type of foundation.
7. Type and height of piers.
8. Depth and velocity of water.
9. Type of abutment.
10. Ease of falsework erection.
11. Need for special equipment.
12. Need for maintaining traffic during construction.
13. Limit on construction time.
14. Complex forming costs and design details.
15. Span arrangements, beam spacing, etc.

Figure 5.1 shows the economic span lengths of various type structures based on average conditions. Refer to Chapter 17 for discussion on selecting the type of superstructure.

Annual unit bridge costs are included in this chapter. The area of bridge is from back to back of abutments and out to out of the concrete superstructure. Costs are based only on the bridges let to contract during the period. In using these cost reports exercise care when a small number of bridges are reported as these costs may not be representative.

In these reports prestressed girder costs are grouped together because there is a small cost difference between girder sizes. Refer to Unit costs. Concrete slab costs are also grouped together for this reason.

No costs are shown for rolled steel sections as these structures are not built very often. They have been replaced with prestressed girders which are usually more economical. The cost of plate girders is used to estimate rolled section costs.

For structures over a railroad, use the costs of grade separation structures. Costs vary considerably for railroad structures over a highway due to different railroad specifications.

Note: Current costs are given in English units.

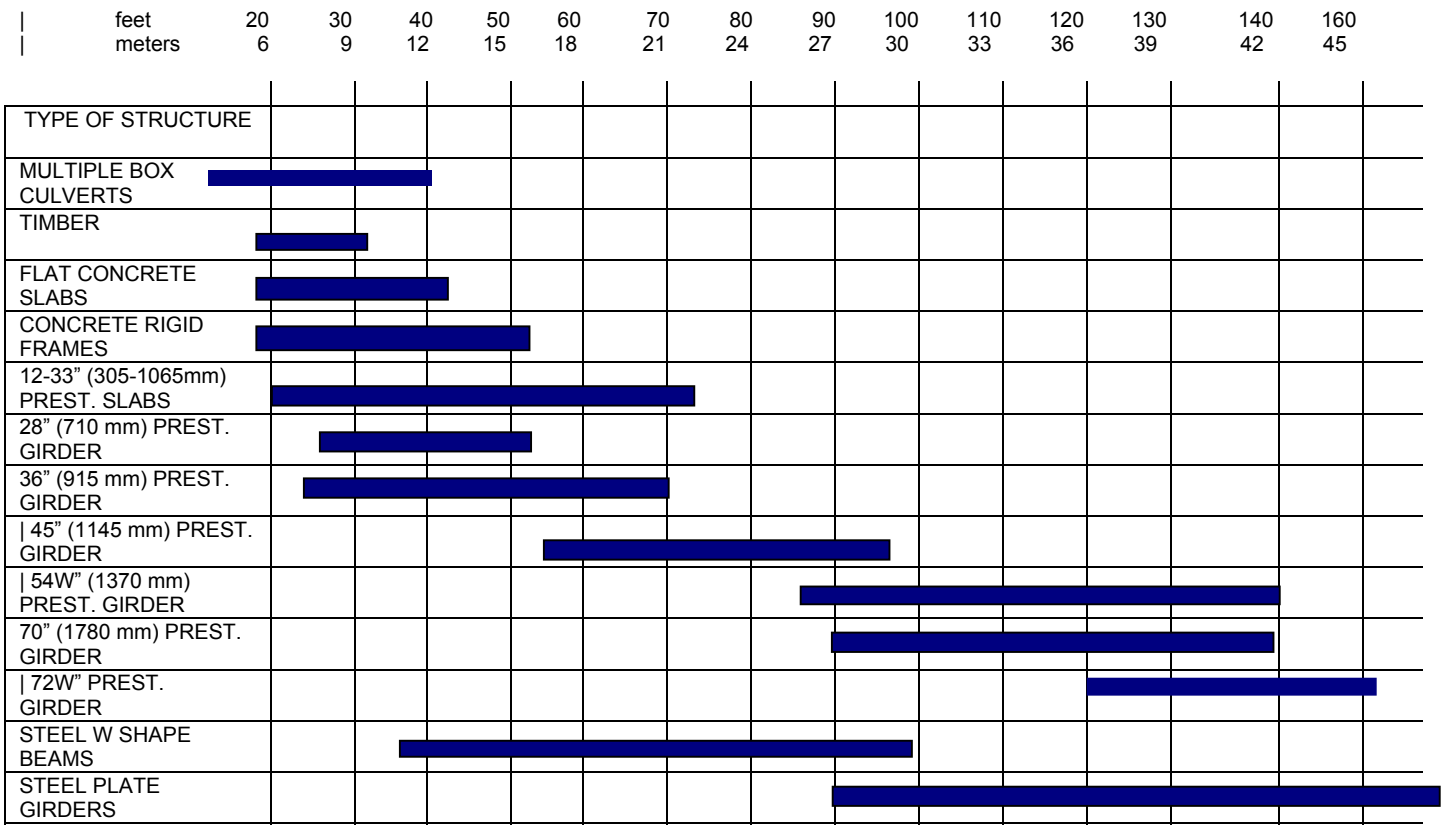

FIGURE 5.1 ECONOMIC SPAN LENGTHS

2005 CONTRACT UNIT BID PRICE NEW STRUCTURES

Item No.	Bid Item	ENGLISH Unit	Cost
210.0100	Structure Backfill	C.Y.	11.78
311.0115	Breaker Run	C.Y.	13.39
502.0100	Concrete Masonry, Bridges	C.Y.	342.31
502.0301	QMP Concrete Structures	C.Y.	8.69
502.1100	Concrete Masonry, Seal	C.Y.	131.05
502.3100	Expansion Device (L.S.)	L.F.	97.32
502.3100	Protective Surface Treatment	S.Y.	6.23
503.0128	Prestressed Girders, I-Type, 28-Inch	L.F.	110.20
503.0136	Prestressed Girders, I-Type, 36-Inch	L.F.	108.88
503.0145	Prestressed Girders, I-Type, 45-Inch	L.F.	113.77
503.0154	Prestressed Girders, I-Type, 54-Inch	L.F.	148.96
503.0155	Prestressed Girders, I-Type, 54W-Inch	L.F.	137.73
503.0170	Prestressed Girders, I-Type, 70-Inch	L.F.	150.50
503.0172	Prestressed Girders, I-Type, 72W-Inch	L.F.	155.91
504.0100	Concrete Masonry, Culverts	C.Y.	346.57
505.0405	Bar Steel Reinforcement HS Bridges	Lb.	0.70
505.0410	Bar Steel Reinforcement HS Culverts	Lb.	0.80
505.0605	Bar Steel Reinforcement HS Coated Bridges	Lb.	0.76
506.0105	Structural Carbon Steel	Lb.	1.27
506.0605	Structural Steel HS	Lb.	1.29
506.2605	Non-Laminated Elastomeric Bearing Pads	Each	76.00
506.2610	Laminated Elastomeric Bearing Pads	Each	734.69
506.3005	Welded Shear Stud Connectors, 7/8” x 4”	Each	2.10
506.3010	Welded Shear Stud Connectors, 7/8” x 5”	Each	2.77
506.3015	Welded Shear Stud Connectors, 7/8” x 6”	Each	2.35
506.3020	Welded Shear Stud Connectors, 7/8” x 7”	Each	4.99
506.3025	Welded Shear Stud Connectors, 7/8” x 8”	Each	3.08
506.4000	Steel Diaphragm, Structure B-	Each	498.50
506.5000	Fixed Bearing Assemblies, Structure B-	Each	825.32
506.6000	Expansion Bearing Assemblies, Structure B-	Each	955.03
507.0200	Treated Lumber and Timber	MBM	3,803.58
508.1600	Treated Timber Piling, Delivered	L.F.	20.00
510.2005	Preboring, Cast-in-Place Concrete Piling	L.F.	6.00
510.3010	Cast-in-Place Concrete Piling, Delivered & Driven, 10 ¾-Inch	L.F.	23.16
510.3012	Cast-in-Place Concrete Piling, Delivered & Driven, 12 ¾-Inch	L.F.	24.75
511.2105	Steel Piling, Delivered and Driven, HP 10-Inch 42 pound	L.F.	20.99
511.2110	Steel Piling, Delivered and Driven, HP 12-Inch 53 pound	L.F.	23.51
511.3000	Pile Points	Each	81.22
513.4050	Tubular Railing, Type F, (2 Rail)	L.F.	71.15
513.4052	Tubular Railing, Type F, (4 or 5 Rail)	L.F.	88.46
513.4055	Tubular Railing, Type H, Structure B-	L.F.	72.24
511.2105	Steel Piling, Delivered and Driven, HP 10-Inch 42 pound	L.F.	20.99
511.2110	Steel Piling, Delivered and Driven, HP 12-Inch 53 pound	L.F.	23.51
511.3000	Pile Points	Each	81.22
513.4050	Tubular Railing, Type F, (2 Rail)	L.F.	71.15
513.4052	Tubular Railing, Type F, (4 or 5 Rail)	L.F.	88.46
513.4055	Tubular Railing, Type H, Structure B-	L.F.	72.24

2005 CONTRACT UNIT BID PRICE NEW STRUCTURES

Item No.	Bid Item	ENGLISH Unit	Cost
513.7050	Steel Railing, Type W, Structure B-	L.F.	73.09
513.4060	Railing Tubular Type M Structure B-	L.F.	140.44
513.4065	Railing Tubular Type PF Structure B-	L.F.	43.76
000000	Concrete Railing, “Texas Rail”	L.F.	114.01
000000	Concrete Parapet, Type ‘LF’ & ‘A’ (Estimate)	L.F.	80.00
514.0445	Floor Drains, Type GC	Each	998.67
516.0500	Rubberized Membrane Waterproofing	S.Y.	25.33
604.0400	Slope Paving, Concrete	S.Y.	38.05
604.0500	Slope Paving, Crushed Aggregate	S.Y.	16.25
606.0300	Heavy Riprap	C.Y.	37.22
606.0700	Grouted Heavy Riprap	C.Y.	29.76
612.0106	Pipe Underdrain, 6”	L.F.	7.75
612.0206	Pipe Underdrain, Unperforated, 6”	L.F.	9.90
616.0205	Chain Link Fence	L.F.	37.57
645.0105	Geotextile Fabric, Type C	S.Y.	2.58
645.0110	Geotextile Fabric, Type DF	S.Y.	2.83
645.0120	Geotextile Fabric, Type HR	S.Y.	2.69
652.0225	Conduit Rigid NonMetallic 2”	L.F.	5.89
SPV.0090	Preboring Steel Piling	L.F.	52.36
	Fiber Reinforced Concrete	C.Y.	380.00
SPV.0165	Architectural Surface Treatment	S.F.	11.15
	Anti-Graffiti Shield	S.F.	0.79
	Modular Expansion Joint	L.F.	602.34
	Preformed Elastomeric Compression Joint Sealer	L.F.	30.73
STSP 206.600	Temporary Shoring	S.F.	19.40
	Temporary Steel Sheet Piling	S.F.	12.00

2005 CONTRACT UNIT BID PRICE REHAB STRUCTURES

Item No.	Bid Item	ENGLISH Unit	Cost
455.0105	Asphaltic Material	Tons	250.00
460.1100	HMA Pavement Type	Tons	268.00
502.5002	Masonry Anchors, Type L, No. 4 Bars	Each	13.79
502.5005	Masonry Anchors, Type L, No. 5 Bars	Each	14.51
502.5010	Masonry Anchors, Type L, No. 6 Bars	Each	23.37
502.5015	Masonry Anchors, Type L, No. 7 Bars	Each	15.00
502.5020	Masonry Anchors, Type L, No. 8 Bars	Each	18.00
502.5025	Masonry Anchors, Type L, No. 9 Bars	Each	30.00
502.6105	Masonry Anchors, Type S, 5/8”	Each	9.79
502.6110	Masonry Anchors, Type S, ¾”	Each	15.71
505.0900	Bar Couplers, ½”	Each	10.85
505.0901	Bar Couplers, 5/8”	Each	12.00
505.0902	Bar Couplers, ¾”	Each	14.96
505.0903	Bar Couplers, 7/8”	Each	14.57
505.0904	Bar Couplers, 1”	Each	19.73
505.0905	Bar Couplers, 1 1/8”	Each	12.00
509.0301	Preparation, Decks	S.Y.	76.12
509.0500	Cleaning, Decks	S.Y.	10.16
509.1000	Joint Repair	S.Y.	566.67
509.1200	Curb Repair	L.F.	23.97
509.1500	Concrete Surface Repair	S.F.	66.98
509.2000	Full Depth Repair	S.Y.	199.54
509.2500	Concrete Masonry, Overlay, Decks	C.Y.	444.84
00000	Structure Repainting (Sand Blasting)	S.F.	8.87
00000	Structure Repainting (Power Tooling)	S.F.	4.31

2000 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. M.)	Total Costs	Cost per Square Meters Entire Job	Cost per Square Meters Super. Only	Cost per Square Foot
Prestressed Concrete Girders	51	26,959	15,010,936	556.81	310.76	51.73
Reinforced Concrete Slabs	96	23,680	13,260,696	559.99	273.85	52.02
Steel I-Beams	3	3,874	2,013,333	519.71	396.76	48.28
Prestressed Box Girders	4	1,515	3,270,689	2158.57	424.27	200.56

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. M.)	Total Costs	Cost per Square Meters Entire Job	Cost per Square Meters Super. Only	Cost per Square Foot
Prestressed Concrete Girders	34	40,936	20,143,989	492.09	197.82	45.72
Reinforced Concrete Slabs	2	910	101,3210	1113.08	417.21	106.62

Pipe Culverts	No. of Bridges	Total Area (Sq. M.)	Total Costs	Cost per Square Meters	Cost per Square Foot
B-17-183	3	62	130,775	2,109	5.76
B-51-45	3	90	87,979	980	8.34

Box Culverts	No. of Culverts	Cost per Meter	Cost per Lin. Ft.
Single Cell	8	2,698.80	823.00
Twin Cell	13	4,157.71	1268.00
Triple Cell	0	0	0

Railroad Bridge	Cost per Meter	Cost per Sq. Ft.
Single Track B-71-108	3,146.35	292.33

Retaining Walls	No. of Bridges	Total Area (Sq. M.)	Total Costs	Cost per Square Meters	Cost per Square Foot
MSE Walls	20	12,620	1,595,260	126.41	11.74
Modular Walls	1	48	9,600	200.00	18.57
Concrete Walls	22	1,307	3,827,783	2,927.94	272.01
Panel Walls	8	2,482	11,398,901	4,593.63	426.65

2001 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
Prestressed Concrete Girders	38	272,884	16,497,543	60.46
Reinforced Concrete Slabs	96	236,514	15,978,487	65.62
Prestressed Box Girders	2	4,553	585,052	128.50
Welded Girder	3	114,847	8,577,439	74.69

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
Prestressed Concrete Girders	32	311,953	14,234,601	45.63
Reinforced Concrete Slabs	2	12,916	696,412	53.92

	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
Arch Structure (Earth Filled)	1	2,761	570,652	206.68
Arch Structure (Rigid Frame)	1	618	215,385	348.73
Trapezoidal Girder (B-62-187)	1	10,716	2,047,608	191.07

Box Culverts	No. of Culverts	Cost per Lin. Ft.
Single Cell	19	641.18
Twin Cell	16	1,138.72
Triple Cell	1	1,528.53

Pedestrian Bridge	Cost per Sq. Ft.
B-59-172 (Prefab Truss-Concrete Deck)	198.23
B-67-269 (Prefab Truss)	106.06

Retaining Walls	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Walls	15	26,337	625,864	23.76
Modular Walls	1	1,230	31,980	26.00
Concrete Walls	4	4,515	246,456	54.58
Panel Walls	3	17,580	898,335	51.10

2002 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	72	426,978	22,420,111	29.78	52.51
Reinf. Conc. Slabs (A1 Abuts)	87	146,305	9,837,515	47.23	67.24
Reinf. Conc. Slabs (A5 Abuts	51	75,545	6,112,823	47.23	80.92
Prestressed Box Girders	3	16,067	1,486,285	64.36	92.51
Welded Girder	3	22,784	2,118,190	55.55	92.97

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	102	546,855	33,980,298	34.90	50.61
Reinforced Concrete Slabs	1	5,351	295,318	29.93	55.19
Steel Rolled Beam	1	9,795	776,839	43.92	79.31

		No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
Tied Arch Structure B-32-202	Segment 2	1	20,742	6,978,784	336.46
Trapezoidal Girder (B-32-202)	Segment 1	1	44,567	5,194,416	116.55
Trapezoidal Girder (B-32-202	Segment 3	1	50,104	5,829,160	116.34

Box Culverts	No. of Culverts	Cost per Lin. Ft.
Single Cell	28	900.20
Twin Cell	18	961.44
Triple Cell	1	1,885.27

Pedestrian Bridge	Cost per Sq. Ft.
B-41-250	65.92
B-13-522	24.67

Retaining Walls	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Walls	12	29,758	1,006,801	33.83
Modular Walls	0	0	0	0
Concrete Walls	17	32,057	2,029,315	63.30
Panel Walls	12	47,009	2,411,464	51.30

2003 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	68	581,949	32,779,454	38.61	56.33
Reinf. Conc. Slabs (All But A5)	186	1,053,352	64,123,025	37.22	60.87
Reinf. Conc. Slabs (A5 Abuts	64	121,535	10,040,393	35.60	82.61
Prestressed Box Girders	1	1,542	145,627	48.00	94.44
Welded Girder	4	68,555	4,891,638	44.04	71.35

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	74	337,434	23,855.720	35.75	70.70
Steel Rolled Beam	2	18,976	1,552,375	81.81	46.05

Retrofit costs only due to changed conditions to accommodate shift in superstructure		No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
Tied Arch Structure (B-32-202)	Segment 2	1	44,567	1,154,497	25.90
Trapezoidal Girder (B-32-202)	Segment 1	1	20,742	410,318	19.78
Trapezoidal Girder (B-32-202	Segment 3	1	50,104	1,447,448	28.89

Box Culverts	No. of Culverts	Cost per Lin. Ft.
Single Cell	17	762.62
Twin Cell	18	1,125.75
Triple Cell	2	1,883.73

Railroad Bridge	Cost per Sq. Ft.
B-53-227 (3 Tracks)	302.89

Retaining Walls	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Walls	22	71,111	1,866,582	26.75
Modular Walls	1	2,570	41,762	16.25
Concrete Walls	14	30,382	2,024,275	66.63
Panel Walls	2	1,751	148,178	84.62

2004 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	40	427,288	28,260,949	43.54	66.14
Reinf. Conc. Slabs (All But A5)	55	133,415	9,226,375	34.13	69.16
Reinf. Conc. Slabs (A5 Abuts	45	80,963	6,386,110	36.93	87.71
Prestressed Box Girders	5	8,453	731,673	51.14	86.56
Steel Plate Girder	2	97,218	9,923,598	77.56	101.86
Arch Structure	2	8,332	866,649	0	104.01

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	72	701,487	46,153,750	42.99	65.79
Rigid Frame	1	14,661	2,018,224	0	137.66
Steel Plate Girders	2	51,668	3,405,347	54.32	74.70

Box Culverts	No. of Culverts	Cost per Lin. Ft.
Single Cell	8	840.68
Twin Cell	10	1,190.99
Triple Cell	2	1,598.99

Railroad Bridge	Cost per Sq. Ft.
B-55-181 (1 Tracks)	405.50

Retaining Walls	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Walls	26	147,869	5,682,475	38.43
Modular Walls	0	0	0	0
Concrete Walls	12	27,789	1,881,180	67.70
Panel Walls	32	251,343	31,168,806	124.01

2005 YEAR END STRUCTURE COSTS

STREAM CROSSING STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	36	427,627	27,984,030	39.51	65.44
Reinf. Conc. Slabs (All But A5)	48	152,215	10,707,339	38.59	70.34
Reinf. Conc. Slabs (A5 Abuts	36	54,583	5,112,320	44.51	93.66
Prestressed Box Girders	2	3,582	471,911	78.88	131.75
Steel Plate Girder	1	18,119	2,439,964	104.88	134.66
Arch Structure	2	17,062	3,297,909	0	193.29
Post-Tensioned Slab	1	16,643	1,512,908	35.95	89.29

GRADE SEPARATION STRUCTURES

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	23	318,918	22,709,977	61.49	71.21
Steel Plate Girders	2	27,585	3,689,778	107.10	133.76

Box Culverts	No. of Culverts	Cost per Lin. Ft.
Single Cell	16	1,326.71
Twin Cell	11	880.03
Triple Cell	0	0
Aluminum	1	3,043.00

Railroad Bridge	Cost per Sq. Ft.
None this Year	

Retaining Walls	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Walls	13	30,189	74,958	24.68
Modular Walls	0	0	0	0
Concrete Walls	9	20,445	3,125,863	152.89
Panel Walls	5	43,069	2,762,167	64.13